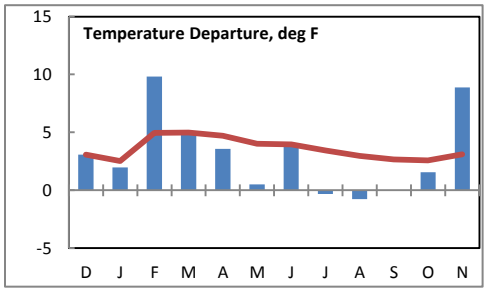
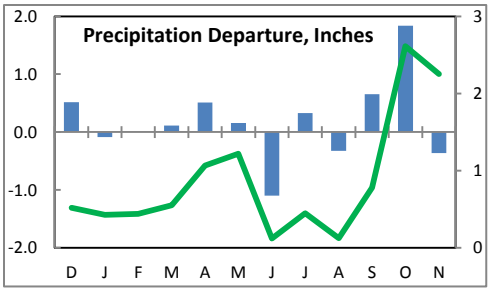
Montana Weather/Precipitation Summary

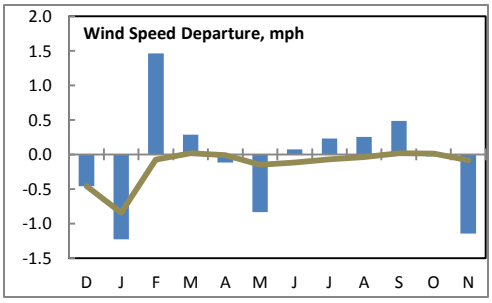
November 2016 NOAA's National Weather Service Great Falls Montana

A broad ridge of high pressure aloft dominated Montana's weather during November (Fig. 1). This pattern brought above normal temperatures and below normal precipitation to the state. November's winds were near to below normal across the state.

Statewide composite temperatures averaged much above normal for the month. The red line on the graph to the right shows the cumulative 12-month departure from normal. The temperature anomalies ranged from +2.6°F at Plains to +12.1°F at Simpson (Fig. 2). The warmest average monthly temperature was 47.1°F at Badger Peak, and the coolest was 28.9°F at Yellowmule RAWS (Gallatin). The greatest positive anomaly was along the hi-line along the international border. The warmest average temperatures ranged from near Great Falls to Big Horn County, while the coolest were at higher elevations of the southwest and west. This was the 6th warmest November of record. For the past 12-months, the statewide composite average temperature is 8.9°F above normal. Nine of the last 12 months have had warmer than normal temperatures.







The monthly departure from normal for precipitation across Montana is shown in Figure 3. The wettest area was in northwest Montana. A large are of central and eastern Montana received little or no precipitation. The highest precipitation amount recorded was 8.60-inches at Poorman Creek (Cabinet Mtns). Elsewhere, 3.40" was reported at southwest of Libby, and 4.30" at Many Glacier. Statewide, this month averaged 0.46", or 0.36" below normal. The statewide composite precipitation for the past 12 months is 2.25" above normal. The green line on the graph to the right shows the cumulative 12-month departure from normal. Seven of the past 12 months have measured above normal precipitation.
Most of the state did see some snow in November, anywhere from flurries to feet. A weather system brought 17" to Red Lodge around the 18th. At the end of the month, around 6" fell over portions of extreme eastern Montana.

The statewide average winds were weaker than normal in November. Glasgow was a notable exception, recording their 4th windiest of record. Statewide, the month ranked as the 2nd calmest November of record. The statewide composite average was 7.9 mph, 1.1-mph below normal. The brown line of the wind graph to the right shows the 12-month cumulative statewide wind departure from normal. The 12-month average is running 0.1-mph below average. Six of the past 12 months have had above normal average speeds. The fastest average speed was 21.8 mph at Deep Creek RAWS (Glacier). At lower elevations, the strongest average was 16.1 mph at Norris Hill. The strongest wind gust was 76 mph near East Glacier on the 14th.

Refer to NEIC's State of the Climate report for the latest monthly discussion:
http://www.ncdc.noaa.gov/sotc/

Nov 1-15
The first half of November was warm and generally dry. Several days from the 9th-14th produced record high temperatures. The first significant precipitation fell over a period starting on the 15th. This was also a period with stronger sustained wind speeds. The highest gust in the state occurred on the 14th.

Nov 16-30
After a period with precipitation that lasted through the 17th, dry and mild conditions prevailed until near the end of the month. During the mid-month precipitation event, Red Lodge picked up 17". Most amounts across the state were much lighter. The first below normal average temperatures in the state occurred on the 17th. This was during the coldest 2-day period in the state. At the end of the month, another storm system moved south of the state. Most areas again picked up a little precipitation, with the heaviest across the southeast. Broadus and Richey received around 7" of snow. Strong winds accompanying the snow (gusts to 55 mph) produced considerable blowing of the snow.

Precipitation/convection

Severe convective weather occurred on 0 days in November, which is normal.

Fall season summary
The average temperature for the fall period (Sep-Nov) was 47.0°F (3.5°F above normal). This was the 10th warmest of record and the warmest since 1998.
The composite precipitation for this period was 5.36", or 2.13" above normal. September and October were particularly wet. This ranked as the second wettest fall of record, ranking only behind the fall of 1946.
Composite snowfall was 5.0". This was 6.1" below normal and the lightest fall snowfall since 2001.
For winds, the average state wind speed was 8.4-mph, 0.2-mph below normal. This was the 18th calmest such period of record.

November summary information:

High Temperature	78°F at Powderville (4th) & Loma (9th)	**Greatest Precip**	3.40" at Libby 28SSW
Low Temperature	-13°F at West Yellowstone (18th)		8.60" at Poorman Crk SNOTEL (Lincoln)
Warmest Ave Temp	47.1°F at Badger Peak	**Peak Wind Gust**	84 mph at Deep Creek RAWS (14th)
Coolest Ave Temp	28.9°F at Yellow Mule RAWS		75 mph near Denton (31st)
Range of Temp departures	+2.6°F at Plains to +12.1° at Simpson	**Highest Ave Wind**	13.4 mph at Harlowton 16.9 mph at Deep Creek RAWS
21 city mean monthly Temperature/Normal	39.5/30.6F normal. 6th warmest of record (since 1880). 95th percentile. Jan-Nov 48.4/45.3 3.1F above normal. 2nd warmest of record.	**20 city mean monthly wind speed/Normal**	8.6 mph/8.8 mph; 17th calmest of record (since 1936). 34th percentile. Jan-Oct 8.9 mph/9.0 0.1-mph below normal. 27th calmest of record.
22 city mean monthly precipitation/Normal	0.46"/0.82" – 56% of normal. 31st driest of record (since 1880). 22nd percentile. Jan-Nov 16.09"/14.36" - 1.73" above normal. 28th wettest of record.		

Historical Rank of Precipitation (inches)
for the Current Month and Water Year to Date

Location	Nov	% of Norm	Rank	Pcntl	Oct 1 – Nov 30	% of norm	Rank	Pcntl	Years
Baker	0.00	0%			0.96	56%			19
Billings	0.38	51%	55	47	3.89	194%	3	2	116
Belgrade	0.42	55%	48	59	2.87	153%	11	13	80
Butte	0.47	78%	46	37	2.78	201%	11	8	123
Cut Bank	0.26	72%	40	36	1.33	166%	22	19	110
Dillon	0.27	69%	36	46	2.49	231%	2	1	77
Glasgow	0.06	15%	70	58	3.17	276%	2	1	119
Great Falls	0.28	47%	68	54	2.04	141%	31	24	125
Havre	0.00	0%	84	61	3.52	349%	3	1	137
Helena	0.02	4%	86	62	1.70	145%	35	25	138
Jordan	0.00	0%			2.89	226%			20
Kalispell	0.62	43%	79	64	5.48	225%	4	2	123
Lewistown	0.06	8%	81	67	0.95	52%	84	69	121
Livingston	0.25	42%	67	58	3.57	193%	5	4	114
Miles City	0.00	0%	76	54	0.97	74%	72	51	140
Missoula	0.34	32%	93	67	3.17	162%	19	13	137
Mullan Pass	3.84	79%	49	62	15.33	194%	3	3	77
Wolf Point	0.06	15%			1.56	130%			19
Glendive	0.22	49%	55	44	1.01	67%	57	47	120
Sidney	0.04	7%	6	6	0.81	49%	50	64	77
BZN-MSU	0.87	73%	61	44	4.53	156%	8	5	138

Rankings and Percentiles are 1=driest, higher numbers=wetter.
For an automated version of this chart, updated daily, go to
http://www.wrh.noaa.gov/tfx/dx.php?wfo=tfx&type=&loc=products&fx=PCPNTOTALS

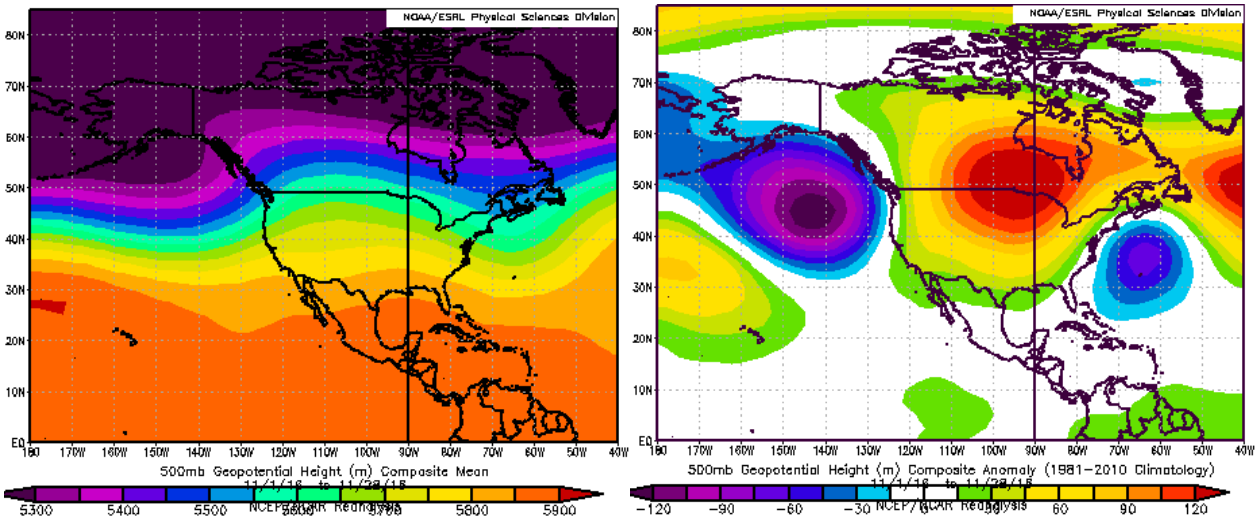


Figure 1. Mean flow at 500 millibars (~18,000 ft) for this month (left) and departure from normal (right).

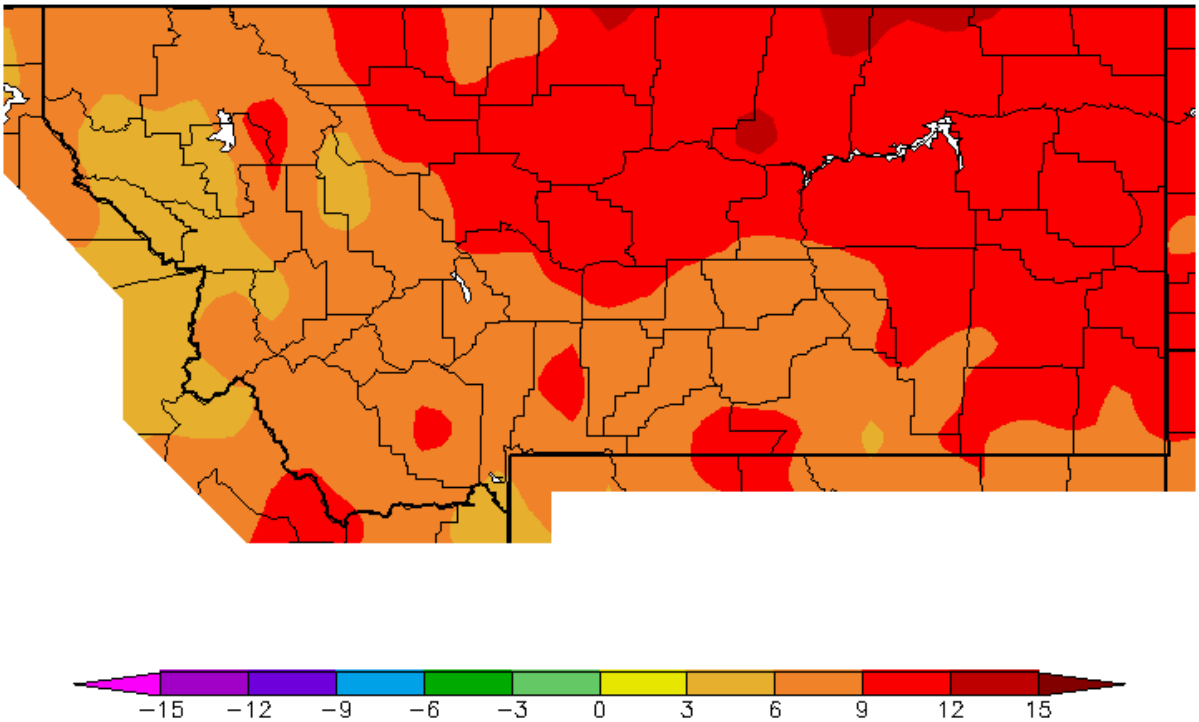


Figure 2. November 2016 temperature departures from normal (°F) (Western Region Climate Center).

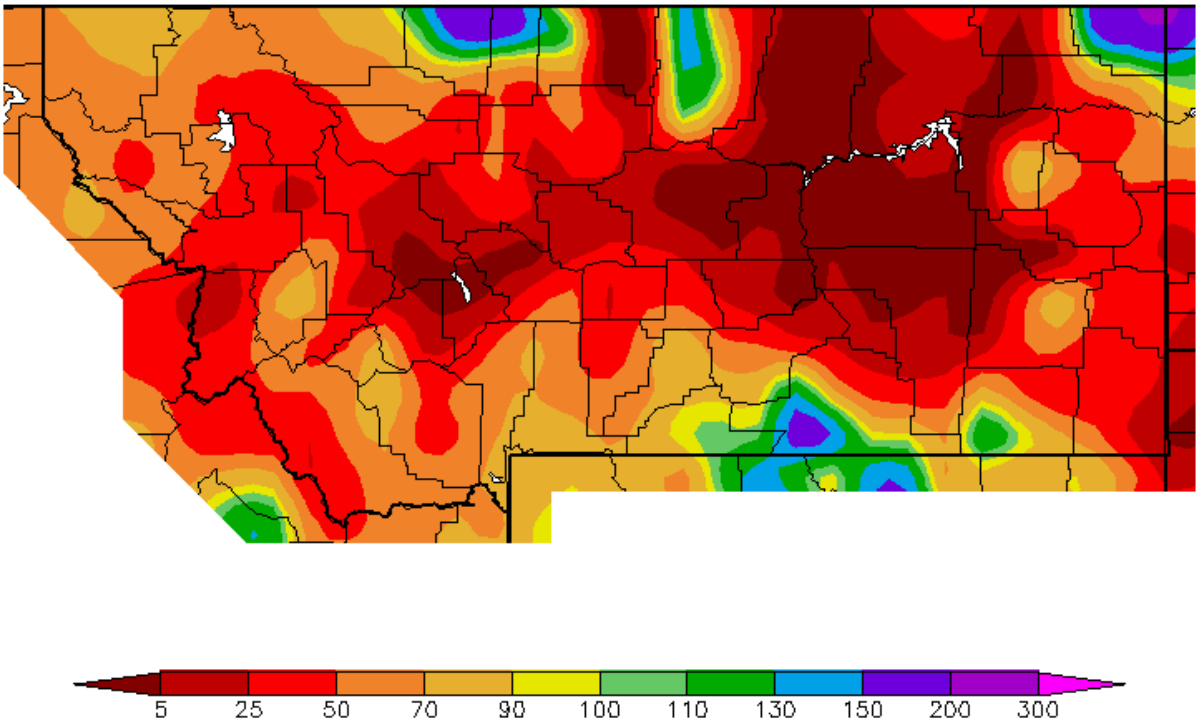


Figure 3. November 2016 precipitation departures from normal (percent) (Western Region Climate Center).

For a state map of % of normal water year precipitation (updated around the 7th of each month), go to: http://www.wrh.noaa.gov/tfx/climate/monthlysum/climatesum.php?wfo=tfx

For the latest information on mountain snowpack from the NRCS, go to: http://www3.wcc.nrcs.usda.gov/snow/index.html

For the latest U.S. Drought Monitor, issued weekly by the National Drought Mitigation Center, USDA and NOAA, go to: http://droughtmonitor.unl.edu/

These data are preliminary and have not undergone final QC by NEIC. Therefore, these data are subject to revision. Final and certified climate data can be access at the National Environmental Information Center (NEIC) http://www.ncdc.noaa.gov. Many more links are on the Drought Information Page of the NWS Great Falls web site at http://www.wrh.noaa.gov/tfx/main/drought.php?wfo=tfx. The climatological record for normals is 1981-2010. The ranking period for temperature, precipitation and snowfall is since 1880. The ranking period for wind speeds is since 1936. The ranking period for soil moisture is since 1995.